

**REMARKS**

Applicants appreciate the consideration shown by the Office as evidenced by the Office Action mailed on May 2, 2003. In that Office Action, the Examiner withdrew from consideration claims 33-62, leaving claims 1-32 under consideration, and rejected claims 1-32. Applicants respectfully request reconsideration of the application by the Examiner in light of the above amendment and the following remarks offered in response to the Office Action.

**1. Restriction Requirement**

Applicants hereby affirm their election with traverse of claims 1-32 for examination on the merits.

**2. Claim Rejections – 35 U.S.C. § 112**

Claims 3-6, 9, 21-24, and 27 were rejected under 35 U.S.C. § 112, second paragraph. Applicants have amended claims 3, 5, 9, 21, 23, and 27 to more clearly set forth the recited limitations, and respectfully submit that these claims are in compliance with 35 U.S.C. § 112, second paragraph. Reconsideration of this rejection by the Examiner in light of this amendment is respectfully requested. Claim 20 was also amended to correct a typographical error.

**3. Claim Rejections – 35 U.S.C. § 102****A. Darolia**

Claims 1, 2, 5, 6, 10-17, 19, 20, 23, 24, and 28-31 were rejected under 35 U.S.C. 102(e) as being anticipated by Darolia, USP 6,255,001. Applicants respectfully traverse this rejection.

Applicants respectfully submit that under 35 U.S.C. 103(c), Darolia may not preclude the patentability of the present application because Darolia, prior art under section 102 (e), and the present application were, at the time the invention was made, subject to an obligation of assignment to a common assignee, the General Electric Company. Applicants respectfully request that the Examiner withdraw the rejections under this applied reference.

**B. Rigney**

Claims 1-8, 10-26, and 28-32 were rejected under 35 U.S.C. 102(b) as being anticipated by Rigney et al. USP 6,153,313. Applicants respectfully traverse this rejection.

Rigney discusses beta phase nickel aluminide coatings. However, Rigney does not teach, suggest, or disclose a substantially single-phase coating having a gradient in aluminum composition extending from the outer surface to the coating-substrate interface, as recited in independent claims 1, 18, 19, and 32 of the present application. The Examiner appears to hold that the existence of an aluminum gradient in aluminide coatings is an inherent property, and cites Spitsberg et al., USP 6,306,524, Examples 1-4 (demonstrating that diffusion from the coating into the substrate is prevented with a diffusion barrier layer) in support of this contention. After careful consideration of the Examiner's position, Applicants respectfully disagree that all elements recited in the above independent claims are taught, suggested, or disclosed by Rigney in light of an expectation of aluminum diffusion during use.

There is no teaching in Rigney in light of the inherency cited by the Examiner that teaches a single-phase aluminide coating having an aluminum gradient as recited in the independent claims at issue. The "gradient" the Examiner refers to occurs when a coating is heated and diffusion occurs from the coating into the substrate. However, while such a phenomenon is well known, it is equally well known that this diffusion significantly depletes the aluminum concentration of the coating, thereby altering its chemical composition and microstructure. In fact, in the examples of Spitsberg cited by the Examiner, there is significant alteration of the chemistry of the aluminide coating, with aluminum levels in significant portions of the aluminide far below their nominal starting levels. See also Spitsberg, col. 2, lines 54-56 (stating that the bond coat after heating has a different composition than when it was first formed). There is nothing taught or suggested by the applied reference in light of an expectation of diffusion that the aluminide coating of Rigney would inherently contain a gradient in aluminum concentration while at the same time maintaining its composition above 30 atomic percent at the coating-substrate interface, because while Rigney discusses a coating having an appropriate aluminum composition, the knowledge in the art, as exemplified by Spitsberg, teaches that this composition would be degraded below required levels at the onset of the aluminum diffusion necessary to cause the "gradient." In short, there is no teaching, suggestion, or disclosure that both the chemistry

and the gradient would inherently coexist, as they must according to the claims at issue in the present application.

In light of the above, Applicants respectfully submit that independent claims 1, 18, 19, and 32, as well as their respective dependent claims at issue, are allowable over the applied reference. Favorable reconsideration is respectfully requested.

**C. Peterman et al.**

Claims 1, 10, 11, 19, 28, and 29 were rejected under 35 U.S.C. 102(b) as being anticipated by Peterman et al USP 5,660,886. Applicants respectfully traverse this rejection.

Peterman describes a duplex nickel-aluminum-boron coating formed by plating Ni-B on a substrate, overcoating with aluminum, and heating to interdiffuse the two layers. The Examiner cites Figure 1 of Peterman in an attempt to demonstrate that this reference describes the coating recited in the claims at issue. However, the coating is not "a substantially single-phase coating" as recited in independent claims 1 and 19 of the present application. In Figure 1, the coating contains multiple Ni-Al phases, including a band of  $\text{NiAl}_3$  and  $\text{Ni}_2\text{Al}_3$ , as well as a layer of aluminum and a layer of Ni-B. See Fig. 1 and col. 5, line 63. Furthermore, even if somehow the bands of Ni-Al phases are considered "coatings" in and of themselves, there is no evidence from Figure 1, nor is there any mention in the text of the reference, that a gradient of aluminum exists. One skilled in the art would interpret Figure 1 to show two bands of intermetallic phase having a constant Al concentration across their respective thicknesses, within the expected error of the measurement technique. An estimate of this error can be made by observing the rightmost band, which contains  $\text{NiAl}_3$ . This compound has zero solubility of Al (see, for example, ASM Handbook, vol.3, "Alloy Phase Diagrams," p. 2-49, ASM International, 1992) and thus the formation of a gradient of Al within a layer of this material is physically impossible. Any slope perceived in the concentration profiles across these layers is merely an artifact of the statistics and would not be taken by one skilled in the art to be a concentration gradient absent any guidance from the text, which is in fact not present. Finally, there is no mention in any of the other examples of a concentration gradient of aluminum across a single phase aluminide coating, and in fact, in several instances there is discussion on the formation of secondary phases such as titanium borides. Clearly this reference does not teach, suggest, or disclose "a substantially single-phase coating disposed on said substrate, wherein said coating comprises nickel (Ni) and at least about 30 atomic percent aluminum (Al), wherein said coating further

comprises a gradient in Al composition, said gradient extending from a first Al concentration level at an outer surface of said coating to a second Al concentration level at an interface between said substantially single-phase coating and said substrate" as recited in claims 1 and 19 of the present invention.

In light of the above, Applicants respectfully submit that claims 1 and 19, along with their respective dependent claims 10-11 and 28-29, are patentably distinct from Peterman.

#### **4. Claim Rejections – 35 U.S.C 103(a)**

Claims 10-12 and 28-30 were rejected under 35 U.S.C. 103(a) as being unpatentable over Rigney et al. Claims 10-12 depend from independent claim 1, and claims 28-30 depend from independent claim 19, which independent claims are believed to be allowable for the reasons set forth above. Applicants respectfully submit that claims 10-12 and 28-30 are allowable because each of these claims depends from an allowable independent claim.

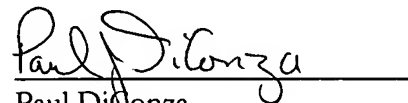
#### **5. Allowable Subject Matter**

Applicants note with appreciation the Examiner's comments concerning the allowability of the matter recited in claims 9 and 27. As described above, Applicants believe these claims are free of the indefiniteness rejection stated in the Office Action.

#### **6. Conclusion**

In light of the remarks presented herein, Applicants submit that the case is in condition for immediate allowance and respectfully request such action. If, however, any issues remain unresolved, the Examiner is invited to telephone the undersigned at the number provided below.

Respectfully submitted,



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